

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/14/2010 has been entered.

Priority

The priority granted for the instant claims is 7/09/03 which is based on priority application 10/616,241.

Applicant has amended the claims and refers to the 08/870,608 application to point to support for the instant invention. The examiner does not agree that the cited portions of the 08/870,608 application provide support for the instantly claimed invention.

Applicant argues that the priority reference must be considered in its entirety, ie it must be considered as a whole. It is with this type of consideration in view of the

portions cited by applicant that priority for the claimed invention is denied to the 08/870,608 application.

Applicant first points to example 27-a of the '608 application and assert that this example refers to a sense strand and an antisense strand and refers to the strands as oligoribonucleotides. Applicant then points to original claims 78, 79, and 80 of the '608 application and assert that the claims recite "oligonucleotide". Applicant then makes the assertion that the application therefore teaches double stranded oligonucleotides that are oligonucleotide or oligoribonucleotides that are chemically modified.

It is noted that both Example 27-a and claims 78-80 describe or recite "double-stranded RNA substrate" The claims of the '608 application require "RNA" and a specific structure as described by Example 27-a.

Applicant asserts that any description of modifications in the '608 application must be considered for both single stranded and doublestranded compounds. This position is not agreed with. The '608 application , when considered as a whole , provided a description of single stranded RNA or RNA-like oligomers for use to hybridize to a target RNA for cleavage by a double stranded RNase protein. Nowhere in the application is there a description of a double stranded oligonucleotide for use as a pharmaceutical. For example, when one reads the summary of The Invention section of the '608 application it is stated "In accordance with this invention there are provided oligomeric compounds formed from a linear sequence of linked ribonucleotides that are specifically hybridizable to a preselected RNA target." At page 16 it is stated "It has now been found that the oligomeric compounds of the invention have certain RNA like

features that allow them to form double stranded structure with a targeted RNA region and the double stranded structure is subsequently degraded . . .” At page 20 it is stated “Thus the compounds of the invention can be used to modulate the expression of any suitable target RNA. . .” The description provided in the specification clearly is drawn to single stranded compounds for use as inhibitory compounds.

Applicant point to page 26 for support for conjugate groups on double stranded oligonucleotides. It is noted that this portion of the specification teaches that equipment for oligonucleotide synthesis was known at the time of invention of the ‘608 application. A look at the paragraph preceding it is clear that the equipment is noted for making “The oligoribonucleotides and oligoribonucleosides used in accordance with this invention. . .”

It is noted that only in claims 78-80 and in examples 27-29 are double stranded oligonucleotides taught. The rest of the specification and claims are drawn to single stranded RNA oligomers for use in hybridizing to a target RNA to inhibit expression. Nowhere else in the specification is a double stranded oligomer described. In the Example 27-29 the double stranded oligomers are described a substrate RNA. The only utility taught for these double stranded oligomers is for use in affinity columns and for use in dsRNase detection. The specification, taken as a whole , clearly differentiated between the invention drawn to an oligomer for use in inhibiting target RNA and a description of a double stranded RNA substrate with a specific structure for use in affinity columns or for use in dsRNase detection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 9, 101, and 110-114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuschl et al [US 2004/0259247], Woolf et al [US20040054155], Schwarz et al[Molecular Cell, Vol.10:537-548,9/2002] et al and Manoharan et al[Manoharan, M. Antisense Drug Technology, Principles, Strategies, and Applications, Crooke, S. T. ed., Marcel Dekker, New York 2001, Chapter16, pages 391-467, cited by applicant].

The claimed invention is as clearly set forth in the claims.

Tuschl et al have taught the use of siRNA molecules for the inhibition of a desired target nucleic acid. It has been taught that the preferred length of these double stranded RNAs is 19-25 nucleotides. It has been taught at paragraph 15 and 179-181 what positions of an siRNA molecule are important for function and what areas are

modifiable such as 5' and/or 3' ends. Tuschl also teach that known modifications such as 2'-O modifications can be used in siRNA compounds. For example, 2'-O modifications can be used at the 3' and/or 5' end of the oligonucleotides in an siRNA. It has been taught to use siRNA in cell culture to determine gene function, for example (see paragraphs 28 and 29, for example). At paragraph 16 it has also, for example, been taught that phosphorothioate linkages can be used in siRNA compounds. Tuschl et al have taught at paragraphs 28-33 that carrier mediated delivery is an option for siRNA introduction into cells (see paragraph 33, for example). Tuschl et al do not specifically teach conjugates.

Manoharan has taught the use of Lipidic nucleic acids where it has been taught the use of moieties such as cholesterol linked to terminal ends, backbones or bases of antisense oligonucleotides where it is asserted these provide for more efficient antisense administration to cells. It has been taught that attachment at the 2' position of an oligonucleotide should minimize interference with hybridization. Monoharan et al has shown that it was well established at the time of invention to utilize cholesterol as a means to mediate cellular delivery of oligonucleotides. It has been taught by Monoharan et al that cholesterol can be attached to the 3' end or 5' end of an oligonucleotide.

Woolf et al have taught siRNA compounds and further teach that cholesterol moieties as well as many other moieties can be attached to siRNA compounds for enhanced uptake into cells in vitro and in vivo. Woolf et al teach for example:

Detail Description Paragraph:

[0144] Conjugating agents bind to the oligonucleotide in a covalent manner. In one

embodiment, oligonucleotides can be derivitized or chemically modified by binding to a conjugating agent to facilitate cellular uptake. For example, covalent linkage of a cholesterol moiety to an oligonucleotide can improve cellular uptake by 5- to 10-fold which in turn improves DNA binding by about 10-fold (Boutorin et al., 1989, FEBS Letters 254:129-132). Conjugation of octyl, dodecyl, and octadecyl residues enhances cellular uptake by 3-, 4-, and 10-fold as compared to unmodified oligonucleotides (Vlassov et al., 1994, Biochimica et Biophysica Acta 1197:95-108). Similarly, derivatization of oligonucleotides with poly-L-lysine can aid oligonucleotide uptake by cells (Schell, 1974, Biochem. Biophys. Acta 340:323, and Lemaitre et al., 1987, Proc. Natl. Acad. Sci. USA 84:648).

Detail Description Paragraph:

[0145] Certain protein carriers can also facilitate cellular uptake of oligonucleotides, including, for example, serum albumin, nuclear proteins possessing signals for transport to the nucleus, and viral or bacterial proteins capable of cell membrane penetration. Therefore, protein carriers are useful when associated with or linked to the oligonucleotides. Accordingly, the present invention provides for derivatization of oligonucleotides with groups capable of facilitating cellular uptake, including hydrocarbons and non-polar groups, cholesterol, long chain alcohols (i.e., hexanol), poly-L-lysine and proteins, as well as other aryl or steroid groups and polycations having analogous beneficial effects, such as phenyl or naphthyl groups, quinoline, anthracene or phenanthracene groups, fatty acids, fatty alcohols and sesquiterpenes,

diterpenes and steroids. A major advantage of using conjugating agents is to increase the initial membrane interaction that leads to a greater cellular accumulation of oligonucleotides.

Schwarz et al have taught that the 3' end of an antisense strand of a siRNA compound can be blocked and still provide adequate inhibition of its target. Schwarz also teach the importance of not blocking the 5' end of the antisense strand of a siRNA.

One in the art would clearly combine the teachings of Tuschl, Woolf et al, and Manoharan et al to make the instant invention since Tuschl has taught the use of siRNA in cells. Manoharan provide a teaching of how to make and use lipidic moieties in oligonucleotides for enhanced cellular delivery and Tuschl et al have taught locations where siRNAs can be modified, where Schwarz et al have shown that the 3' end of the antisense strand can be modified while the 5' end of the antisense strand is preferably not. Woolf et al have taught that one in the art can apply cholesterol moieties to an siRNA compound to facilitate delivery to cells. The prior art teaches that the use of such conjugates was known in the art to enhance delivery of nucleic acid into cells, for example. The determination of which strand or both strands to add substituents would clearly have been a matter of optimization as the general use of substituents as claimed was established in the art at the time of invention. Tuschl and Schwarz et al have provided a clear basis for the locations of modification in a siRNA. The claimed invention appears to amount to the use of a known oligonucleotide delivery method [cholesterol conjugation] and a known oligonucleotide that would be delivered to cells[siRNA]. It is noted that applicant has no working examples of the invention as

claimed, and the prior art provides substantially the same level of teaching as the instant specification, where both the prior art [Woolf et al] and the instant specification teach that any of a multitude of moieties can be attached to siRNA compounds for enhanced delivery and targeting.

The invention as a whole would therefore have been *prima facie* obvious to one in the art at the time the invention was made.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN MCGARRY whose telephone number is (571)272-0761. The examiner can normally be reached on M-Th (6:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Heather Calamita can be reached on (571) 272-2876. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sean R McGarry
Primary Examiner
Art Unit 1635

/Sean R McGarry/
Primary Examiner, Art Unit 1635